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DIVISION DIRECTOR: **DIVISION 6 PHOTOBIOLOGY AND PHOTOCHEMISTRY**

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CIE DIVISION 6 NEWSLETTER

February 14, 2000

Contents

Division 6 Year 2000 Meeting in San Francisco

Division 6 will hold its annual meeting in San Francisco at 7:00 pm on July 2, 2000. It will be held at the Hyatt Regency Hotel at Embarcadero Center during the 13th International Congress on Photobiology (ICP), which will be held from 1-6 July. An internet link for the ICP meeting website can be found at Photobiology Online, **http://www.POL-US.net**, or contact the Secretariat of the 13th ICP at:

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Members of Division 6 are encouraged to register to attend the entire International Congress. There will be celebrations on the U.S. Independence Day (July 4) and many tourist attractions are nearby. A wide variety of subjects of interest to D6 members will be presented in posters and talks, and the presenters will include D6 committee chairs and members. The tentative schedule for the ICP meeting is listed on pages 2-3.

Tentative Schedule for the 13th International Congress on Photobiology (as of 2/18/00)

SATURDAY, JULY 1

8:00 ASP Executive Committee meeting
9:00 ASP Council meeting
1:00 Public Education Symposium [Chairs: Thomas Brennan (US) & Rosalie Crouch (US)]
6:00 Opening Session

- Welcoming comments [Frank Gasparro/John Hearst]

6:15 AIP Presidential Lecture [Pill-Soon Song, University of Nebraska, US]
6:45 Musical interlude
7:15 Keynote:

- James Cleaver, University of California at San Francisco, US
  Xeroderma pigmentosum: the First Dish of the Smorgasboard of DNA Repair

8:00 Welcome reception

SUNDAY, JULY 2

8:00-10:45 Sunday morning symposia

- **Rhodopsins** [Chairs: John L. Spudich (US) & Akio Maeda (JP)]
- **Determinants of Phototoxicity after Photodynamic Therapy** [Chairs: David Kessel (US) & Johan Moan (NOR)]
- **Cellular and Molecular Mechanisms of Photoimmunology** [Chairs: Margaret Kripke (US) & Thomas Schwarz (GER)]
- **Wavelength Dependencies of Skin Reactions** [Chairs: Frank R. deGruijl (NL) & P. Donald Forbes (US)]
- **Photosensitivity Diseases** [Chairs: Henry W. Lim (US), Ryoichi Kamide (JP), & John Hawk (UK)]
- **Photochemistry of Drugs** [Chairs: Miguel A. Miranda (SP), Sandra Monti (IT), & Colin Chignell (US)]

11:00 Finsen Medal Awards
11:30 Plenary lecture II - ASP Research Award Lecture: Christopher S. Foote, University of California at Los Angeles, US
12:30 Mentoring Lunch
1:30 Poster viewing/platform sessions
3:00-5:45 Sunday afternoon symposia

- **Photobiology of the Visual Process** [Chairs: Thomas Ebrey (US) & Motoyuki Tsuda (JP)]
- **Light Adaptation Phenomena in the Photosynthetic Apparatus** [Chairs: Anne-Lise Etienne (FR) & Kris Niyogi (US)]
- **UV Effects on Marine and Aquatic Ecosystems: Understanding the Present, Predicting the Future** [Chairs: Lara J. Hansen (US), Jennifer Hoffman (US) & Anita G. J. Buma (NL)]
- **Omega-3 Fatty Acids in Photobiology** [Chairs: Lesley E. Rhodes (UK) & Ard.A. Vink (NL)]
- **Cellular Responses to Photoinduced Signal Transduction** [Chairs: David A. Boothman (US) & Kris Valerie (US)]
- **Clinical Photoimmunology** [Chairs: Craig A. Elmets (US), Paul Bergstresser (US), & Takeshi Horio (JP)]

6:00 ASP Business Meeting
7:00 Meeting: CIE Division 6 on Photobiology [Chair: David H. Sliney]

MONDAY, JULY 3

8:00-10:45 Monday morning symposia

- **Circadian Rhythms I: Photoreceptors and Signal Transduction Pathways** [Chairs: Michael Menaker (US) & Yoshitaka Fukada (JP)]
- **Photomovement of Microorganisms** [Chairs: Elizabeth Getzoff (US), Donat P. Hader (GER), &Francesco Lenci (IT)]
- **Therapeutic Effects of Light** [Chairs: Herbert Honigsmann (AUS) & Warwick L. Morison (US)]
- **Clinical PDT I: Oncologic Applications** [Chairs: Thomas J. Dougherty (US) & Harubumi Kato (JP)]
- **Chemoprevention of Photocarcinogenesis** [Chairs: Hasan Mukhtar (US) & Vivian Reeve (AUSL)]
- **Multi-Photon Photochemistry in Photobiology** [Chairs: Irene E. Kochevar (US), Nicholas E. Geacintov (US), & Dieter E. Leupold (GER)]

11:00 Plenary lecture III: Finsen Award Lecture, Winslow Briggs, Carnegie Institution, US
Phototropin: The Pursuit and Capture of an Elusive Plant Photoreceptor
11:45 Plenary lecture IV ASP Young Investigator Award Lecture: Emmanuel Liscum, University of Missouri, US
Phototropin Signaling: A Light-Activated Phospho-relay Leading to Differential Hormone-Dependent Gene Expression and Growth?
12:30 Lunch
1:30 Poster viewing/platform sessions
3:00-5:45 Monday afternoon symposia

- **Circadian Rhythms II: Clock Genes and Clock-Controlled Genes** [Chairs: Charles Weitz (US) & Paolo Sassone-Corsi (FR)]
- **Photoaging** [Chairs: Marjan Garmyn (BEL), John Voorhees (US), & Yoshiki Miyachi (JP)]
- **New Non-oncologic Applications of Photodynamics I** [Chairs: Ehud Ben-Hur (US) & Hans J. Schuitmaker (NL)]
- **Benefits, Risks and Public Health Policies** [Chairs: Jan C. van der Leun (NL), Masamitsu Ichihashi (JP), & Janusz Z. Beer (US)]
- **Ocular Effects of Ultraviolet Radiation** [Chairs: Seymour Zigman (US) & Usha Andley (US)]
- **Product-Based Elucidation of Photodynamic Mechanisms in Biological Systems** [Chairs: Jean Cadet (FR) & Albert Girotti (US)]

6:00 Dinner
7:30 Evening Workshops

- **So You Want to Become an NIH Grantee**
- **Benefits, Risks and Public Health Policies** [Chairs: Janusz Z. Beer (US), Jean-Pierre Cesarini (FR) & Jan C. van der Leun (NL)]

Tentative Schedule for the 13th International Congress on Photobiology (as of 2/18/00)

TUESDAY, JULY 4

8:00 Plenary lecture V Antony Young (St. Thomas' Hospital, UK)
A Specific Controversy in Photobiology: The Ability of Sunscreens to Protect Against Endpoints Other than Erythema
8:45 Plenary lecture VI Finsen Medal Lecture: Toru Yoshizawa
9:30-12:15 Tuesday morning symposia

- **Solar UV Radiation Effects on Plants: Interactions with Abiotic and Biotic Stress Factors** [Chairs: Linda Chalker-Scott (US), Don Krizek (US), & Merdelyn Caasi-Lit (PHLP)]
- **Raymond Latarjet (1911-1998): A Symposium Emphasizing his Critical Roles in Photobiological Sciences** [Chairs: Ethel Moustacchi (FR) & Richard B. Setlow (US)]
- **Photomorphogenesis: Structure and Function of Phytochromes** [Chairs: Masamitsu Wada (JP), J. Clark Lagarias (US), & Wolfgang Gaertner (GER)]
- **Clinical PDT II: PDT with ALA and mTHPC** [Chairs: Stanley B. Brown (UK) & Allan R. Oseroff (US)]
- **Public Health Benefits of Regular Sunscreen Use** [Chairs: J. Frank Nash (US) & Mark F. Naylor (US)]
- **Nucleotide Excision Repair of UV Damage, Replication and Transcription** [Chairs: Leon Mullenders (NL) & Isabel Mellon (US)]

12:30 Free afternoon

WEDNESDAY, JULY 5

8:00-10:45 Wednesday morning symposia

- **Bioluminescence** [Chairs: J. Woodland Hastings (US), Anthony K. Campbell (UK), & Yoshi Ohmiya (JP)]
- **Cutaneous porphyrias** [Chairs: Gillian M. Murphy (IRE), Mario Lecha (SP), & Shigeru Sassa (US)]
- **Urocanic Acid Photobiology** [Chairs: Frances Noonan (US), Edward deFabo (US), & Prue Hart (AUSL)]
- **Electron Transfer Reactions in DNA** [Chairs: Gary B. Schuster (US), Christopher S. Foote (US), & Bernd Giese (SWZ)]
- **Environmental and Genetic Factors in Melanoma Development** [Chairs: Ronald D. Ley (US) & Honnavara Ananthaswamy (US)]
- **Mechanisms of Cellular Responses to PDT** [Chairs: Tayyaba Hasan (US) & Jacques G. Piette (BEL)]

11:00 Plenary lecture VII [Petra Fromme (GER)]
Recent Progress in Resolution of the Three-Dimensional Structures of Photosystems I and II
11:45 Plenary lecture VIII [ASP Presidential Lecture: Charles J. Gomer (US)]
Photodynamic Therapy: From Oxygen To Hypoxia, An Adjunctive Approach
12:30 Lunch
1:30 Poster viewing
2:00-5:45 Wednesday afternoon symposia

- **Photosystem I: Structure, Dynamics, and Biogenesis** [Chairs: Donald A. Bryant (US) & Francis-Andre Wollman (FR)]
- **Environmental and Molecular Epidemiology of Human Skin Cancer** [Chairs: Kenneth H. Kraemer (US) & Bruce Armstrong (AUSL)]
- **In vivo Spectroscopy** [Chairs: Claudio H. Sibata (US), Nikoforos Kollias (US) & Hubert van den Bergh (SWZ)]
- **Light Signal Transduction in Plants** [Chairs: Eberhard Schaefer (GER) & Garry C. Whitelam (UK)]
- **Photobiology in Cardiology** [Chairs: Kathryn Woodburn (US), Stephen Bown (UK), & Ton G. van Leeuwen (NL)]
- **Full-Spectrum Apoptosis: "Vive la Difference!"** [Chairs: Dianne E. Godar (US), Nancy L. Oleinick (US) & Rex M. Tyrrell (UK)]

7:00 Reception and banquet

- Retrospective: A Century of Photobiology" [Thomas P. Coohill (US)]

THURSDAY, JULY 6

8:00-10:45 Thursday morning symposia

- **New Non-oncologic Applications of Photodynamics II** [Chairs: Julia G. Levy (CAN) & Tom M.A.R. Dubbelman (NL)]
- **Engineering Photosynthesis: Artificial and Natural Systems** [Chairs: Ana L. Moore (US) & Alisdair N. Macpherson (SWE)]
- **Melanin Photobiology** [Chairs: Albert Schothorst (NL), Kowichi Jimbow (JP), & Zalfa Abdel-Malek (US)]
- **Chronobiological Photoreceptors in Mice and Humans** [Chairs: Dan A. Oren (US) & Steven W. Lockley (UK)]
- **Oncogenes and Suppressor Genes in Non-melanoma Skin Cancer** [Chairs: Douglas E. Brash (US) & J. Fredrik Ponten (SWE)]
- **Light Damage to Ocular Tissue** [Chairs: Tadeusz Sarna (PO) & Rosalie K. Crouch (US)]

11:00 Plenary lecture IX, Edna Roe Lecture: Bridget Barry
11:45 Plenary lecture X, "Photomedicine in the 21st Century" [John Hearst (US)]
12:30 Lunch
1:30-4:00 Thursday afternoon symposia

- **Site Dependency in DNA Damage, Repair, & Mutation** [Chairs: David L. Mitchell (US), Gerd P. Pfeifer (US), & Regen Drouin (CAN)]
- **UVA1 Photobiology: from Molecular Mechanisms to Clinical Implications** [Chairs: Jean Krutmann (GER) & Akimichi Morita (JP)]
- **Green Fluorescent Protein** [Chairs: James Spudich (US) & Julie A. Theriot (US)]
- **Blue-Light Sensing Systems: Mechanisms and Comparisons** [Chairs: Anthony R. Cashmore (US), Masakatsu Watanabe (JP), & Paul Galland (GER)]
- **Anti-oxidant Networks in Photobiology** [Chairs: Garry R. Buettner (US), Christopher R. Lambert (US), & David McGarvey (UK)]
- **Psoralen Photochemotherapy** [Chairs: Thomas B. Fitzpatrick (US), Francesco Dall'acqua (IT), Yoshiki Tokura (JP), & Kiichiro Danno (JP)]

4:00 Closing ceremony
6:00 ASP Council Meeting and Dinner

Agenda for the Division 6 Meeting in July 2000.

The tentative agenda is provided below:

Meeting at 7:00 pm at the Hyatt Regency Hotel at Embarcadero Center, San Francisco

1. Welcome by Director
2. Approval of agenda
3. Approval of minutes of Division meeting
4. Secretary's report
5. Editor's report
6. Progress reports from Technical Committee chairs
7. Progress reports from Reporters
8. Progress reports from Liaisons with ICNIRP, WHO, IEC and ISO
9. Proposals for dissolution of TCs and reporterships
10. Proposals for new TCs and reporterships
11. Future meetings
12. General
13. Adjournment

Minutes of the 1999 D6 Meeting in Warsaw.

Day 1 of the 1999 D6 Meeting.

1. The subject meeting sessions were held at the Warsaw Technical University (Politechnika Warsawska), Warsaw, Poland on Saturday, 26 June 1999. Jean-Pierre Cesarini chaired both sessions.

2. **Colin Driscoll - Measurement of UVR.** Driscoll began by citing the three general UV measurement techniques with: spectroradiometers, personal dosimeters and broad-band instruments. He noted the major causes of measurement uncertainties: cosine response linearity, spectral response stability, temperature response (offset error) and calibration and transfer uncertainties related to bandwidth. He described the spectral distribution of solar radiation, noting that UV-C is eliminated by the ozone layer. He noted that different "standardized" solar spectra are used in different countries. NRPB used a June spectrum taken at Chilton on a clear day, some Americans used one from Albuquerque, NM; he suggested the value of an international reference solar spectrum for UV discussions. He cited the general recommendation of ICNIRP which suggested that there was only a very minimal risk of skin cancer at about 30 MED (about 60 SED) per year. He cited the ICNIRP (IRPA/ICNIRP) guideline of an effective $S(\lambda)$-weighted exposure of 30 J/cm^2 per day. Regarding UVR monitoring, he showed the typical design of a double-grating monochromator based spectroradiometer and explained that it would be desirable but frequently impractical to employ a spectroradiometer. He gave as one example of a broad-band meter with an interference blocking filter and cosine/diffuser radiometer such as the IL1700 (US). The Robertson-Berger (R-B) meters available from Solar Light (US), Yankee (US), and a Japanese firm, were useful for environmental monitoring. He then showed a mannequin fitted with polysulfone dosimeters. He was skeptical of the small personal monitors, as they had very specific calibration relative to terrestrial sunlight. He argued for better coordinating existing spectral and broad-band radiometers, for better QA procedures, for correlating solar measurements with different tropospheric and stratospheric conditions, for computer-based data storage and retrieval systems and he thought that the CIE could be useful in this effort, and finally, for better personal dosimeters and intercomparison.

3. **Discussion.** In the discussion, Driscoll indicated that the current state of uncertainties in these

measurements was about 10%. He wanted a simple guide on how new-comers and biologists could measure solar UV. The effort of CIE TC 2-36 in this regard was only beginning, and Driscoll hoped to see some results before he retired. Lin (Singapore) invited all to his TC meeting on Tuesday. It was noted that the WMO UV Data Center in Canada could be reached on the web.

4. **Rikard Küller - Psychobiological Effects of Light and Diurnal Rhythms.** Küller spoke of a joint effort with his institution and researchers in Saudi Arabia, and England (52N) to study populations with seasonal affective disorder (SAD), and more particularly, what he termed "Sub-SAD." He indicated that "Sub-SAD" had symptoms of general fatigue, sadness, social withdrawal and sleeping disorders. He mentioned the CIE D6 diskette of over 1,000 references related to SAD. He explained that one of the goals of his multi-center study was to better distinguish between SAD and sub-SAD. They studied the prevalence of SAD and sub-SAD as affected by distance from a window and time of the year. There number of subjects N at each locations was 107 in England, 253 in Sweden, and 406 in Sweden. They took questionnaires five times during the year. These questionnaires tested mood scales, mental health symptoms of seasonality, subjective health and a record of sick-leave, etc. They also performed various measures of indoor lighting and temperature and time of year. About 50% of their study population showed a gradual onset of symptoms in October and ending in March. Other small subgroups had a shorter period and still another 2 percent which came on in March and ended in May (springtime depression). They considered serious cases as about 11 percent of their study population. The yearly trend was the same between Sweden and England, but in Saudi Arabia, where the length of day and night varied little, there was no clear indication of a seasonal disorder in Saudi Arabia (less than 3 % if at all). Those whose work setting was greater than 2 m from the nearest window suffered greatest in October and March, but in December and January, there was no apparent effect, as might be expected considering the low sky luminance in the "dark of winter." There was also an improvement if people worked in offices of high luminance.

5. **Discussion.** It was noted that November was particularly overcast in England and Scandinavia and wondered if sky luminance alone was not the key factor. Küller replied that the most important factor seemed to be the length of day. There was a question as to whether all of this could not be just motivational--to sit near a window, but Küller replied this was not a major effect. Others asked about the spectral sensitivity of the effect, but he stated that white light was best. Kohmoto asked about rural versus urban setting (where high levels of street lighting) exist; however, Küller thought this was not a significant factor.

6. **Dr. Kawinashi - Measurements of Outdoor UV-B.** Kawinashi's measurements used a detector developed by Sasaki (Japan) with a response from 280 nm to at least 330 nm [hence its spectral response included shorter wavelength UV-A]. He showed plots of radiance distribution across the sky which were obtained by this instrument for a solar elevation angle of 70 degrees. It was not clear what the field-of-view of his instrument really was. He also reported on a study of a wide variety of building materials which were measured for reflectance and transmittance of materials which might be exposed to daylight. He showed reflectance of wood materials of about 5-6% for wavelengths below 330 nm. However, building tiles showed a rapid increase in spectral reflectance for wavelengths greater than about 300 nm. He attempted to derive a correlation coefficient for UV-B reflectance and visible reflectance, but these were scattered very extensively.

7. **Kohtaro Kohmoto - Measurements of Light Sources in accordance with the Draft CIE/IEC Standard for Photobiological Lamp Safety.** Kohmoto cited Table 19.2 of the IESNA Lighting Handbook which listed different adverse health effects of optical radiation. He briefly listed the Exempt and risk groups 1, 2 and 3. He measured seven representative lamps, e.g., an incandescent lamp--a

500-W tungsten-halogen, a 400 W clear mercury, a fluorescent lamp, a 360 W high pressure sodium lamp. Those measured were in either an Exempt Group or Risk Group 1.

8. **Masato Sato and Kaoto Takahashi - Circadian Change in Brightness Perception.** They measured body temperature and visual sensitivity of test subjects every 17 minutes (about 1,000 s) throughout the day and measured the environmental lighting values. There was a steady increase of body temperature throughout the day and apparent reduction in scotopic vision from about 9 to 10:30 a.m. This was based upon a subjective sense of brightness and they concluded that people sense that objects are brighter at nighttime.

9. **Knut Inge Fostervold (for Jonny Nersveen) – A Study of the Effectiveness of Various Efforts to Apply Subjective Questionnaires Attempting to Relate Lighting Levels to Health and Well-Being.** They studied measures of concentration, vigilance, subjective symptoms, job stress, anxiety and depression as related to standard lighting parameters, temperature and CO-2. He described the battery of these different tests. Although they have completed the measurements, they have not completed the statistical evaluation.

10. **Stanislaw Marzec - The Efficiency of Regeneration of Ultraviolet-Induced Photochemical Damage in Ocular Tissue.** Using a source at 254 nm for UV-C, 280 nm and 296 and other UV and visible sources to expose cornea and conjunctiva with increasing intervals between exposures. Only after 96 hours separation between exposures did they find no additivity. The threshold doses varied as a function of the single-pulse threshold limit C-1, a repair constant k, an exposure separation time t and the threshold for second exposure separated by an infinite time C-2 as:

$$\text{Threshold} = C1 + C2\,[1-\exp(-kt)]$$

For a wavelength of 254 nm, he found k = 0.03 h-1, C1 = 400, and C2 = 370 J/m^2.

11. **Roger Wibom - Non-Visual Light Modulation – A Possible Contributor for Claimed Hypersensitivity to Electricity.** He explained firstly the complicated "disease" apparently found only in Sweden where people felt badly if in a certain electrical environment. He described a double blind test where they administered subjective tests of well-being, sense of exposure to light as agreeable or not agreeable. Those claiming a hyper-sensitivity to electricity were also detecting flicker. This was even detectable objectively with an EEG alpha activity. Although the group and controls could not visually distinguish between high and low light modulation, the electro-sensitive cohort felt poorly under high modulation.

12. **Stephen DiDomenico – Protective Qualities of UV Shading Materials.** He noted that Natasha von Tonder, South Africa, the co-author unfortunately could not attend. A protection factor based only upon the fabric attenuation of a shading material if part of the sky was visible. They employed the CIE spectral irradiance model to determine the ground irradiance and then modified this based upon a shade ratio. They gave as an example a parasol with a PF of 50, but the real protection was only 4 to 5. He argued for a future CIE standard which would allow manufacturers of shade structures. Cesarini stated that the factor of 20% exposure of the face took place when a person dons a rimmed hat.

Day 2 of the 1999 D6 Meeting

1. The subject meeting was held at the Warsaw Technical University (Politechnika Warsawska), Warsaw, Poland on Monday, 28 June 1999. David H. Sliney, Division Director, opened the meting at

10:00 a.m., after the CIE Opening Session for Division meetings.

2. **Special Presentations to Division 6, and Discussion Groups.** After approval of the agenda, the participants introduced themselves. The minutes of the previous year's Division Meeting held in Gaithersburg, MD, were approved. Sliney explained that three special presentations had been scheduled: Wout van Bommel (NL), a Vice President of the CIE, would speak about several important changes in the direction and membership of the CIE; Rikard Küller (S) would speak on psychobiology and light; and Masako Sasaki (J) would speak about her study of the dividing lines in the UV spectrum. It was explained that as soon as the Division meeting was completed in the early afternoon, TC 6-47 would meet in the same room under the chairmanship of Rolf Bergman to review the final comments received on the Draft CIE Standard on the Photobiological Safety of Lamps. The three Division 6 Technical Committees relating to ultraviolet disinfection TCs 6-35, 6-43 and 6-46 would meet jointly in a separate room at that time under the leadership of Richard Vincent.

3. **Division Director's Report; Officers and New D6 Publications for 1999.** Sliney noted the importance of recruiting more energetic and younger participants in CIE Division 6 activities and the current vacancy in the Associate Division Director (ADD) position which has been vacant for several years since the tragic loss of Mutzhas. This ADD related to the subjects which did not require a background in the life sciences, such as photochemistry, photobiological measurement, testing of fabrics and shading structures, etc. He then reviewed the past year's accomplishments and noted that three reports had been published in a new issue of the CIE Collections in Photobiology and Photochemistry (Divisions of UVA1, UVA2, UVB, etc.; UV dosimetry and eye protection; and Photobiological Safety Standards for Lamps), and three TC reports were in the final editing and balloting process (UV Index; Blue-light hazard; and high-resolution erythemal action spectrum). In addition, the CIE standard erythemal action spectrum and the Standard Erythemal Dose (SED) Unit had been established as an ISO standard as well. As if this were not enough to be quite proud of, a 700+ page book, *Measurement of Optical Radiation Hazards,* had been published as an outcome of the CIE/ICNIRP/NIST/CHPPM International Symposium on the Measurement of Optical Radiation Hazards held last September at NIST, Gaithersburg, MD, USA. He explained that the text had been crafted to be a handbook, which made use of the material presented at the MORH Symposium, but went much further into detail and was not a proceedings document. Although 1,000 copies had been printed by ICNIRP, he could not present a copy for exhibition, since all of the books were still in a bindery in Germany. ICNIRP was publishing the book as a joint CIE/ICNIRP publication. He expected that all attendees at the MORH symposium would receive a copy in the mail in the next month. He indicated that only a limited number of copies would be available for sale from the CIE CB, and those who wanted to purchase a copy or two should plan to purchase a copy very soon.

4. **Technical Committee Status Updates. The status of each Division 6 TC was reported (see Table below). Only a few were discussed in detail and will be reported in the minutes.**

5. **6-08 Guidelines for Obtaining Action Spectra.** Sliney noted his disappointment that Dieter Kockett was not present to report on the progress made last year in TC 6-08 on Guidelines for Obtaining Action Spectra. This was the oldest standing TC, and the report was nearly finished.

6. **6-11 Systemic Neuroendocrine Effects of Optical Radiation on the Human.** Jennifer Veitch (CDA) reported that she had taken over as Chair of TC 6-11 on Systemic (Neuro-endocrine) Effects and she would report a final draft at a meeting of TC 6-11 to be held in conjunction with a joint meeting of the US and Canadian National Committees of the CIE to be held in Toronto, CDA in the Fall.

7. **6-15 A Computerized Approach to Reflection, Transmission, and Absorption Characteristics of the Human Eye.** It was reported that TC 6-15 chaired by Nils Svendius required a new TC Chair, inasmuch as Svendius had retired and this was a matter of "number crunching" of the currently available data. Sliney stated that he would seek a new chair to complete the project.

8. **6-16 Psychobiological Effects of Lighting.** Rikard Küller, University of Lund, Sweden spoke on the progress of his TC, which had completed their report. After listing the participants, he explained that they had conducted a major review of the literature and he listed 71 citations on ultradian rhythms, 453 citations on circadian rhythms, quite a number related to menstrual cycles and he noted several other categories. He described how his database was developed. He explained that the only remaining task was to obtain assistance from the CIE CB in formally obtaining copyright release for some of the abstracts. Sliney explained that the report would soon be submitted for approval after a final review by Veitch and Brainard. Küller explained that he expected final completion in September after he returns from summer vacation.

9. **6-24 Sunscreen Testing; 6-28 UV-A Sunscreen Testing; 6-31 Immediate Pigment Darkening.** Jean-Pierre Cesarini explained that he had an extensive list of photobiologically active chemical compounds which he had decided only to summarize in the most limited manner in order to complete this report. The original goal to provide in-depth information had been shown to be overly optimistic, and such a list would never be completed. He also reported on the progress of related TCs 6-24 on sunscreen testing, 6-31 on immediate pigment darkening (IPD) and 6-28 on UV-A sunscreen testing. All of these TCs were expected to meet jointly at the NRPB meeting on the health effects of UV to be held in Oxford, England in the fall. There was extensive discussion on the difficulties of achieving a consensus in the cosmetics, phototoxicology and solar-protection communities. In essence, the IPD report was no longer a key aspect and would be completed as a state-of-knowledge on the subject. The sunscreen TCs would review the relative merits of the three methods and report the state-of-the art in this difficult area. Since the US FDA had just published a report on sunscreen testing, he thought the time was once again appropriate to complete these reports and perhaps even to provide some CIE recommendations. He noted the need for a standardized solar-simulator emission spectrum for broad-band sunscreen testing, as pointed out by Frank Wilkinson of Australia a couple of years ago.

10. **6-25 Spectral Weighting of Sunlight.** On behalf of Stephen Wengraitis, Chair of TC 6-25 on the spectral weighting of sunlight, Sliney presented an overhead transparency from the draft report of TC 6-25. Wengraitis was producing a number of tables of the solar spectra from CIE 85-1989 (with an extension below 305 nm) weighted to the key action spectra, such as erythema, blue light, safety, etc.

11. **6-36 Protective Qualities of UV Shading Materials.** Stephen DiDomenico (USA) reported for Natasha van Tonder (SA) Chair of TC 6-36 on shading materials. He summarized their work in better defining the geometrical shading effects of solar umbrellas, etc. He pointed out that although the fabric in some shading structures might be listed at 50, the effective protection factor might be only 5.

12. **6-39 UV Radiation in Lighted Environments.** Kohtaro Kohmoto (J) presented the status of his TC 6-39 on the UV in lighted environments. He presented the ratios of UV watts to 1,000 lm of a number of representative lamps. He stated that the data tended to fall into three general categories. This was un-weighted UV and erythemally weighted UV. He proposed three classes, I, II, and III based upon the relative UV content in the spectrum. He explained that this was not only of health interest, but also of interest to artists, museum curators, advertising display specialists, et al. This led to a discussion of their liaison with CIE TC 3-22 on Museum Lighting. Later, Ne'eman (Israel) summarized the work of TC 3-22. Three was some discussion as to the state of knowledge of the action spectra of paints,

pigments, newspaper (NIST action spectrum), and other materials. Ne'eman noted that some action spectra of organic dyes extended into the visible and that it depended upon the absorption spectrum of the chromophore. Liaison would continue. Other liaisons with other committees were then reviewed.

13. **Briefing on Changes in the Direction and Membership of CIE.** Wout van Bommel (NL), a Vice President of the CIE, explained that for the first time, international or regional organizations (NGOs) and even multi-national corporations could be supporting members. Organizations like the International Olympic Committee (interested in sports lighting) and large corporations could provide support and have the honor of putting a CIE logo and "supporting member" on their stationery, etc. This was all a new concept, but it was clearly necessary to provide the funds to increase staff and CB activity to support the Divisions and TCs. Publication income was expected to become less in the future, and these and other new directions were essential. This was all part of a CIE "Business Plan." He also explained that Divisions were now authorized to prepare documented research needs and to even propose particular research teams, and that such documents could be used by researchers in their grant proposals. Furthermore, the CIE could approach potential corporate sponsors for research funding in a needed area. This was of particular interest to some of the research scientists in attendance. The machinery for this type of activity was still not quite in place. The attendees were highly receptive to van Bommel's presentation, although Kohmoto noted that there was concern that the new approach might reduce income from local divisions of international companies which was critical to the life of the national committees. This led to further discussion and Sliney explained that the CIE General Assembly had solved this problem with certain safeguards. Cesarini noted that COLIPA and similar organizations could be approached for support. He, Sliney and others agreed to explore those groups in the field of photobiology. van Bommel was thanked for his important efforts in this area.

14. **Other TC Summaries.** Sliney provided several other summaries, and explained that Forbes had completed the report on the UV Carcinogenesis Action Spectrum and also was nearing completion on the carcinogenesis testing protocol. A number of other TCs had really only begun to work. He asked the participants to consider proposals for new work over the lunch hour.

15. **Proposed CIE Handbook on Photobiology**. Sliney reported that the CIE Board of Administration (BA) had been exploring the idea of a series of CIE Handbooks. Division 6 could consider developing a **CIE Handbook on Photobiology**. He explained that such a project would clearly take several years, and given the past performance of voluntary workers, he did not expect that it would be created in just a couple of years, but within the next one or two quadrenniums it was not unrealistic. We now had a great deal of material prepared in the MORH book and with a number of recent TC reports on many topics, it was not unreasonable to expect that this material could be arranged into a Handbook. He asked for the attendees to consider whether they would be willing to be an editor or co-editor of the Handbook.

16. **Proposed New TC's and Reporterships.** In the afternoon session of the D6 meeting new items of interest were discussed. Three new TCs were proposed.

a. TC 6-51 would examine the proper "Determination and Measurement of Passive UV Air Disinfection" under the chairmanship of Richard Vincent (US). Initial members would be Cabaj (A), Bergman (USA) and Kohmoto (J). The Terms of Reference would be: To specify the biologically meaningful measurement distances and positions in installations of UV germicidal lamps for open, upper-air disinfection. From CIE CB, F. Hengstberger has worried that metrological input was not considered by Div.6. It was found that more clarification was needed

on the Terms of Reference before the TC can be approved by the CIE CB (VPT will contact DD6 on this matter).

b. TC 6-52 would develop a "Standardized Solar Simulator Spectral Irradiance Distribution for Sunscreen Testing" under the chairmanship of Robert Sayre (USA), with an initial membership of Jean-Pierre Cesarini (F), Frank Wilkinson (Aus) J. Chandon (F), and Daniel Berger (USA). The terms of reference would be to provide a standardized solar simulator emission spectrum for testing sunscreens. Spectral tolerance values will be provided. CIE CB has since then stressed that a TC working on a standard needs at least members from five different member countries. Subject to this condition, the TC was approved by CIE CB as TC 6-51.

c. TC 6-53 would re-examine "Personal Dosimetry for UV Radiation." A number of new devices had developed since the publication of the previous Division 6 report on this subject. The TC has not been officially approved by CIE (the chair only recently having been appointed).

d. A new reportership by Masako Sasaki (J) would examine the "Short-hand Notations of UV Selected Bands in Photobiology and Photochemistry." Since this required further discussion, it was postponed to the end of the meeting. The Terms of Reference which were later agreed to were: To examine terms such as "UV-A" and "UV-B" as well as "Near UV" and "Middle UV" and their use by different groups using definitions at variance with the standardized CIE terms, UV-A (315 - 400 nm) and UV-B (280 - 315 nm) and relate the impact in summations of spectral irradiance. CIE Report 134/1 provided the rationale for retaining the CIE definitions which have not changed since the 1930's, but this report will explain computational impact and may also suggest alternative terms for specialized purposes.

17. **Discussion Regarding the New Reportership**. Masako Sasaki (J) explained her concerns about the current concerns with the standardized CIE terms, UV-A (315 - 400 nm) and UV-B (280 - 315 nm). She explained that their use by different groups using definitions at variance with CIE bands had created concern and perhaps the dividing line should be re-examined. This led to a lengthy discussion about the conclusions of CIE Report 134/1 by TC 6-26 chaired by Cesarini, and why the definitions of the 1930's should be retained for consistency despite the incorrect use by many photodermatologists in the US. It was pointed out that all effects should really be described with action spectra and the spectral band designations were only useful as an approximating, short-hand notations. However, Sasaki had related in her poster at the 24th Session, the impact in summations of spectral irradiance for the different dividing lines, etc. Therefore, despite the publication of CIE Report 134/1 which provided the rationale for retaining the CIE definitions, it was agreed to follow a proposal of K. Kohmoto (J) to appoint Sasaki as a Reporter to prepare a report which would explain the computational impact upon sums of spectral quantities where different divisions are made. Sliney suggested that she also explore alternative terms to UV-A and UV-B, such as UV-α or UV-beta for specialized purposes.

18. **Next Division 6 Meeting**. It was tentatively decided that the next meeting of Division 6 should take place in conjunction with the next meeting of the International Congress on Photobiology to be held in the first week of July 2000 in San Francisco, CA (see section below). If other proposals were received before November by DD6, they would be seriously entertained.

Recently Completed Technical Committee Projects and New Publications.
The officers of Division 6 are pleased to announce that the following Technical Committees have notified us that their efforts are completed, and their documents will be submitted for balloting by CIE:

6-16 Psychobiological Effects of Lighting (Küller)
6-32 Action Spectrum for Photocarcinogenesis (Forbes)
6-34 Testing Protocols for Photocarcinogenesis Safety Testing (Forbes)
6-41 A Proposed Global UV Index (Weatherhead - approved for publication)
6-47 Photobiological Lamp Safety Standard (Bergman)

They are also pleased to announce that the first ISO-accepted Standard from Division 6 has been published. The standard is available as:

ISO 17166:1999 / CIE S 007 / E-1998 Erythema Reference Action Spectrum and Standard Erythema Dose

Abstracts for all CIE Publications can be found on the CIE Web Page at cie.co.at/cie/home.html. The officers of Division 6 compliment the chairs of the above TC's and the TC members, and wish all committee members the best of success with their research.

TC Update, as of 14 February 2000

No.	Chair	Title	Status
6-01	Sandor Ferenczi	Actinic Effects on Man	Completed, published as MFKI report.
6-02	Alistair McKinlay	Reference UV-Erythema Action Spectrum	Completed, published in CIE Journal 6/1, 1987. Re-published in CIE 106-1993.
6-03	Bernhard Steck	Photo-kerato-conjunctivitis	Completed, published in CIE Journal 5/1, 1986.
6-04	Charles C.E. Meulemans	Selected Photobiological Information	Closed at Durban 1997 meeting; data available.
6-05	G.S. Sarytchev	Actinic Effects on Plants	Completed, published in CIE Journal 6/2, 1987.
6-06	Kohtaro Kohmoto	UV Actinic Sources of Relevance To Illuminating Engineering	Closed in 1991, no publication.
6-07	G.S. Sarytchev	Recommendation of the Methods of Measurement of Optical Radiation In Terms of Its Effects on the Corresponding Receivers	Transferred to Division 2, TC 2-31. No publication.
6-08	Dieter Kockott	Guidelines for Obtaining Action Spectra	Reported at Gaithersburg 1998 and faxes to D6 chair that draft has been sent out and will be edited based on editorial comments received.
6-09	Bernard Muel	Malignant Melanoma and Fluorescent Lighting	Completed, published in CIE Journal 7/1, 1988.
6-10	Maxim Mutzhas	Photobiological Effects on Human Skin	Completed, published as Annex 2 to Board Report 0302. Also published in CIE Technical Collection 1993 as 103/3.
6-11	Jennifer Veitch	Systemic Neuroendocrine Effects of Optical Radiation on the Human	TC is committed to producing a report by June 2000.
6-12	Jean-Pierre Cesarini	Phototesting of Skin Application for Sun Protection (UV-B)	Completed, published in CIE 90-1991.
6-13	G.S. Sarytchev	Lighting Aspects of Large-Scale Plant Growing in Completely Protected Environments (“Dark Rooms”)	Closed for inactivity; work assumed by TC 6-42.
6-14	Kohtaro Kohmoto	The Blue Light Photochemical Retinal Hazard	Chair has added terms of reference and member list, and has proposed revising standards for eye protectors-specs.
6-15	Nils Svendenius	A Computerized Approach to Reflection, Transmission, and Absorption Characteristics of the	Recommended change of chair

		Human Eye	
6-16	Rikard Küller	Psychobiological Effects of Lighting	Completed, submitted for ballot.
6-17	Lucia R. Ronchi	Spatial and Temporal Variability of Radiation Exposure and Human Behavior	Recommended at Durban, 1997 to close. Other publication by Ronchi.
6-18	A. F. McKinlay	Evaluation of Potential Optical Hazards Associated with "Desk Top" Quartz Halogen Lamps	Completed, published in CIE 103-1993.
6-19	J. Barth	Personal Dosimetry of UV Radiation	Completed, published in CIE 98-1992.
6-20	Jean-Pierre Cesarini	Phototoxicity in Domestic and Industral Environments	A complete file of phototoxic and photoallergic compounds has been completed. They have been classified in 3 categories corresponding to: high frequency, and low frequency. Meeting is scheduled during 1994, after publication of the results of the European Community Commission.
6-21	David H. Sliney	Cataractogenesis by Low-Level Exposure to Ambient Ultraviolet Radiation	Chair working on final draft.
6-22	T. W. Tibbitts	Terminology and Units for Characterizing Photosynthetically Active Radiation for Plants	Completed, published in CIE Technical Collection 106 as 106/8: "Terminology for photosynthetically active radiation for plants"
6-23	Donald T. Krizek	Develop Generalized Action Spectra for Plant Responses to Wavebands from 280 to 1100 nm	Draft expected soon.
6-24	Jean-Pierre Cesarini	Sunscreen and UVA	Report will discuss relative merits of test methods and discuss state of knowledge.
6-25	Stephen Wengraitis	The Conventional Solar Day Weighted by UV Action Spectra	New data recommended for TC at MORH Symposium; chair contacted J. Frederick for info. DD6 recommended use of Green Model.
6-26	Jean-Pierre Cesarini	Standardization of the Terms UVA-1 and UVA-2	Completed, published in CIE 134-1999.
6-27	A. F. McKinlay	Standardization of the Erythema Action Spectrum	Completed, combined with 6-40 and published as CIE Std S007/E1998
6-28	Jean-Pierre Cesarini	Standardization of Sunscreen Testing: Method of UV-A Sunscreen Testing	Group may correspond with similar TC 2-17. Much controversy exists over whether solar simulators are a good representation of real sunlight.

			Awaiting TC 6-24 report. Expect that report will discuss relative merits of test methods and discuss state of knowledge.
6-29	Peter Gies	UV Protective Index for Clothing	Expects to circulate revised draft by March 2000.
6-30	C. F. Wong	Dosimetry of UVR Exposure – UV Protection of the Eye	Completed, published in CIE 134-1999.
6-31	Jean-Pierre Cesarini	Immediate Pigment Darkening	Report will discuss state of knowledge.
6-32	P. Donald Forbes	Action Spectrum for Photocarcinogenesis	Completed, submitted for ballot.
6-33	E. C. de Fabo	Photoimmunological Effects Mediated Through the Skin	Latest copy will incorporate lighting data from new & old lights from NRPB, applied to action spectra. Latest text version sent to de Fabo for comment.
6-34	P. Donald Forbes	Testing Protocols for Photocarcinogenesis Safety Testing	Completed, chair expects to submit to CIE soon.
6-35	Richard L.Vincent	Present State of UV Disinfection	Met with 6-43, 6-46 members at Warsaw 1999 meeting.
6-36	Natasha van Tonder	UV Protective Materials Used in Shading	Further results reported at Warsaw 1999 meeting.
6-37	David H. Sliney	Light and Retinal Disease	More needed animal data was recently provided. Group met at Gaithersburg 1998 meeting.
6-38	David H. Sliney	Photobiological Safety Standards for Lamps	Completed, published in CIE 134-1999.
6-39	Kohtaro Kohmoto	UV Radiation in Lighted Environments	Investigations have been completed and include more than 50 lamps. Need to establish guidelines for lamps.
6-40	Brian Diffey	Erythema Reference Action Spectrum and Standard Erythema Dose	Completed. Published as CIE Std S007/E1998. Also published as ISO 17166:1999/CIE S 007/E-1998.
6-41	Elizabeth C. Weatherhead	A Proposed Global UV Index	Completed, will be published.
6-42	Harald Seidlitz	Plant Growth Chambers	New chair was appointed in Jan. 1999.
6-43	Jain	UV Water Disinfection	Met with 6-35, 6-46 members in Warsaw 1999.
6-44	Myron L. Wolbarsht	Illuminators for Treatment of Infact Hyperbilirubinemia	Chair reported at Gaithersburg 1998 the need for manufacturers to make illuminators with constant output during useful life. Also has developed a meter to measure amount of bilirubin in the patient.
6-45	Alex Ryer	Optical Radiation Hazard	Chair and new recruits met a

		Measurements in the Work Space	Gaithersburg 1998 and composed a first draft for the document.
6-46	Ed Nardell	Standard Action Spectrum for UV Disinfection	Met with 6-35, 6-43 members in Warsaw 1999.
6-47	Rolf Bergman	Photobiological Lamp Safety Standard	Completed, submitted for ballot.
6-48	Janusz Beer	Typical Minimal Erythema Doses	Currently collecting information from research from several international agencies.
6-49	Myron Wolbarsht	Infrared Cataract	New TC
6-50	Joseph Piechocki	Photodegradation of Pharmaceuticals	Gathering prospective members from international agencies, including possible members from China.
6-51	Robert Sayre	Standardized Solar Simulator Spectral Irradiance Distribution for Sunscreen Testing	New TC, proposed at Warsaw 1999.
6-52	Richard Vincent (proposed)	Determination and Measurement of Passive UV Air Disinfection	New TC, proposed at Warsaw 1999. Approval from CIE CB still pending at this writing.
6-53	Gerda Horneck (proposed)	Personal Dosimetry for UV Radiation	New TC, proposed at Warsaw 1999. Approval from CIE CB still pending at this writing.